



AMERICAN FOUNDATION
FOR THE BLIND INC.

ORIENTAL BRAILLE.

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ONE ALPHABET FOR THE BLIND FOR ALL ORIENTAL LANGUAGES.

BY THE

REV. J. KNOWLES,

LONDON MISSIONARY SOCIETY, TRAVANCORE, S. INDIA

(1880-1900),

AND

L. GARTHWAITE, ESQ., B.A. (Lond.),

FELLOW OF THE UNIVERSITY OF MADRAS, MALAYALAM TRANSLATOR
TO GOVERNMENT,

LATE H.I.M. INSPECTOR OF SCHOOLS, MADRAS, ETC.

(1857-1900).

LONDON

THE BRITISH AND FOREIGN BIBLE SOCIETY

146 QUEEN VICTORIA STREET

1902



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[Advance Copy.]

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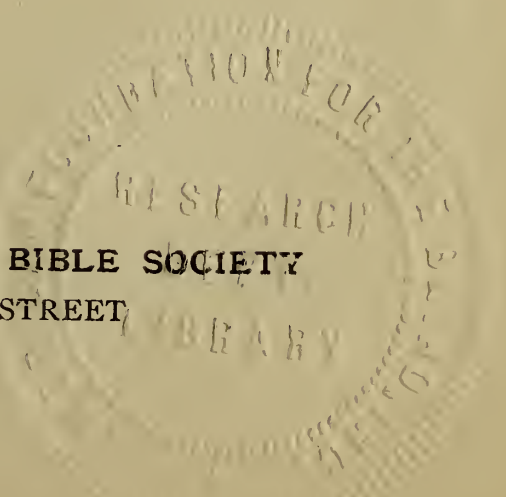
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READING FOR THE BLIND.

The 'Braille' System.

FROM time to time various attempts have been made, in Europe, to teach the Blind to read by touch. The most successful of these is known as 'Braille.' The system was not invented by Braille, but was an improvement on that invented by Ch. Barbier, a French artillery officer. The improvement effected by M. Louis Braille was, however, so great that the Blind may well bear his name in grateful remembrance.

In the Braille system the letters, or characters, are formed by a very simple arrangement of raised points, or dots. They are purely arbitrary signs, and consist of varying combinations of six raised points placed in an oblong, of which the vertical side can hold three, and the horizontal two, points. The groups differ from one another in the number, or position, of the dots, and are separated by spaces from one another. Thus Oriental Braille would be written as follows:—

0	0	00	00	00	0	0		0	0	0	00			00
00	00		0	00	00		0		0	00		0	0	0
	0				0	00		00	0		00	00		0

O R I E N T A L B R A I L L E .

There are—

6 groups with 1 dot each.

15 „ „ 2 dots „

20 „ „ 3 „ „

15 groups with 4 dots each.

6 groups „ 5 „ „

1 group „ 6 „ „

So that there are sixty-three groups to represent letters, stops, numbers, etc.

The groups of dots are felt by the tips of the fingers as the blind person passes them along the lines. Each group is of such a size that the dots come under the tip of one finger. The blind scholar quickly learns to distinguish the dot or dots which represents the various letters, and thus reads his books.

Readers who know what dominoes are may gain some idea of Braille by supposing the dominoes (up to double-sixes) arranged lengthways in lines. Each domino would then roughly represent two letters of Braille.

On the Arrangement of the 'Braille' Groups.

The group of six dots is divided into *upper*, *middle*, and *lower* pairs. The upper pair are marked as 1-2, the middle as 3-4, the lower as 5-6. The dots 1, 3, 5 are called *back* dots; 2, 4, 6 are called *front* dots. The sixty-three possible combinations of the six dots are arranged in *Seven Rows*.

The *First Row* of ten exhausts all possible combinations of the upper and middle dots (except the middle-back-dot combination, the back and front middle combination, and the three combinations consisting of front dots only).

The *Second Row* of ten are formed by adding a lower back dot to each of the combinations in the first row.

The *Third Row* of ten are formed by adding two lower dots to each of the combinations in the first row.

The *Fourth Row* of ten are formed by adding a lower front dot to each of the combinations in the first row.

The *Fifth Row* of ten are like those of the first row, except that they are written in the middle and lower lines (instead of upper and middle).

The *Sixth Row* consists of six of the various combinations having a lower back dot, or a lower back-and-front dot, which do not come in the first five rows.

The *Seventh Row* consists of the seven combinations of front dots only.

How the Braille Signs were assigned to the Letters of the French and English Alphabets.

Having thus arranged the sixty-three combinations in seven *irregular* rows, as above, the letters of the French alphabet were written in alphabetical order over the combinations, then the modified or accented letters. Signs and punctuation marks followed. The combination of dots which came below the letter, modified letter, accented letter, or punctuation mark, was then used to represent that letter or punctuation mark. A whole row was allotted to the punctuation signs.

Thus was formed the 'Braille' Alphabet for the Blind, now the only one used in France. In applying the scheme to English, which does not use accented letters, the accented letters were replaced by digraphs, etc.

The Braille system as now used for English is shown on the accompanying page.

The Braille Alphabet and the "Principle of Least Labour."

In an ideal alphabet for the Blind one principle has always been strongly advocated, viz., that the letters which occur most frequently should be represented by the combinations which have the fewest number of dots. This, it is reasonably urged, would render *writing* easier for the Blind.

It may be that in making the Braille Alphabet this was not taken into consideration at all, or it may be that as the frequency of the occurrence of the letters varies in different languages no attempt was made to follow it. However that may be, the

TABLE I.

THE 'ENGLISH' BRAILLE ALPHABET, WITH CONTRACTIONS.

The *ciphers* represent raised dots, the *hyphens* empty places, in group of six.

	A	B but	C Christ	D	E every	F from	G God	H have	I	J Jesus
1st row	0 - -- --	0 - 0 - --	00 -- --	00 -0 --	0 - -0 --	00 0 - --	00 00 --	0 - 00 --	-0 0 - --	-0 00 --
2nd row	K	L Lord	M	N not	O	P people	Q quite	R right	S some	T that
	0 - -- 0 -	0 - 0 - 0 -	00 -- 0 -	00 -0 0 -	0 - -0 0 -	00 0 - 0 -	00 00 0 -	0 - 00 0 -	-0 0 - 0 -	-0 00 0 -
3rd row	U unto	V very	X	Y you	Z	and	for	of	the	with
	0 - -- 00	0 - 0 - 00	00 -- 00	00 -0 00	0 - -0 00	00 0 - 00	00 00 00	0 - 00 00	-0 0 - 00	-0 00 00
4th row	ch child	gh	sh shall	th this	wh which	ed	er	ou	ow	W will
	0 - -- -0	0 - 0 - -0	00 -- -0	00 -0 -0	0 - -0 -0	00 0 - -0	00 00 -0	0 - 00 -0	-0 0 - -0	-0 00 -0
5th row	,	; be-	: con-	. dis-	? -en-	! .to.	(' his	-in-	' by- .was.
	-- 0 - --	-- 0 - 0 -	-- 00 --	-- 00 -0	-- 0 - -0	-- 00 0 -	-- 00 00	-- 0 - 00	-- -0 0 -	-- -0 00
6th row	-st-	-ing	Nos. -ble	Poetry sign	Apos- trophe	Hyphen com-				
	-0 -- 0 -	-0 -- 00	-0 -0 00	-0 -0 0 -	-- -- 0 -	-- -- 00				
7th row	Prefix	Precede <i>initial</i> letter of contractions.			Precede <i>final</i> letter of contractions.					
	-0 -- --	-0 -0 --	-0 -0 -0	-- -0 --	-0 -- -0	-- -0 -0	-- -- -0			

Numbers.

When preceded by the prefix for numbers, the signs of the 1st row stand for the nine digits and the cipher (1, 2, 3, 4, 5, 6, 7, 8, 9, 0).

result is that, for *English*, the principle of least labour in writing does not hold good. This is most likely the case also in other languages. Taking the letters in the order of the frequency of their occurrence in English, we find that the first ten are *e, t, a, i, o, n, s, h, r, d*, and looking at the Braille we find that the frequently recurring letters *t, n, r* have four-dot combinations, whilst the less used letters *k, b* have only two. So of other letters. Even with regard to classes of letters, it is all chance. Further, as there are fifteen combinations having only two dots and twenty with three dots, *no letter of the English alphabet need have had more than three dots*, whereas *g, n, p, r, t, v, x*, and *z* have each four, and *g* and *y* have five dots.

The Braille Signs and the forms of Roman Letters.

Amongst the various attempts to modify the original Braille assignment of the sixty-three combinations, one was made in France "to arrange the points of the Braille letters so as to bear some resemblance to the corresponding Roman letters." This similarity, after all, was not striking. (It hardly needs remarking that such an attempt would be utterly impossible for Indian languages. Not only are the forms of the letters complicated, but one Indian language has now quite different *forms* of letters from another for the same *sounds*, by reason of gradual changes of letter-forms having crept in. So much is this the case that natives who can quite understand one another when speaking, cannot read a line or even the same words in one another's books.)

*Criticism of the Braille Assignment of the Combinations
to the Letters of the Alphabet.*

It will be noticed that the arrangement of the order in which the Braille combinations come is arbitrary.

Any other order of arranging the combinations might have been followed, e.g., the combinations with one dot might have been taken first, then those with two, three, four, five, and last the whole six. Or the six first, then five, four, three, two, and last one. Or in other ways.

Then in the Braille arrangement it is mainly a matter of chance whether a letter is represented by a one, two, three, four, five, or six dot combination. The letter *a* has one dot, the letter *y* has five, *b* has two, *q* has five, *c* has two, *g* has four, and so on.

Nor is any order according to the number of dots followed, for though *e* has two, *f* three, and *g* four, yet *h* has three and *i* has two. So again *o* has three, *p* four, and *q* five, but *r* has four, *s* three, and *t* has four.

Nor is even the regular order of the *English* alphabet completely followed, for the French had no *w*, so the Braille order is *u*, *v*, *x*, *y*, *z*, leaving out the *w*, which is provided for afterwards. In America the combination for the French *x* is used for the American *w*, French *y* is American *x*, the French *z* is American *y*, and the French *ç* is American *z*.

Owing to one cause and another there has been a further want of uniformity in the use of combinations for digraphs, modified vowels, contractions, and diphthongs.

On the Phonetic Value of English Braille Signs.

It may be noted that the phonetic values of the English Braille signs are a long way removed from the phonetic values of the same signs as used in French, especially in regard to the vowel signs. The French signs have the Italian (or Continental) powers of the letters, the English Braille signs partake of the unphonetic character of the English language. The English phonetic value of the Braille signs would therefore be most misleading for Oriental languages.

ORIENTAL 'BRAILLE.'

In adapting the Braille system of raised dots to Indian and other Oriental languages, the problem to be solved was to find out which combination of raised dots should be assigned to represent each letter so as to make *reading and writing* as easy as possible for the Blind (of whom there are half a million in the Indian Empire alone), and at the same time have one uniform Blind Alphabet for all the languages of India and the East. The solution of this problem is the 'Oriental Braille,' as described below.

As we have already seen, there are various ways of setting out the sixty-three combinations. One such arrangement is given on the accompanying page.

In this arrangement the leading ideas are—

- (a) To take the combinations in *pairs*, and
- (b) To take first pairs with one dot, then pairs with two, three, four, five dots.

There is only one six-dot combination. The combination on the right hand is called the right-hand combination, the combination on the left hand is called the left-hand combination.

We find there are twenty-eight pairs of combinations, and that there are

3 pairs with 1 dot,		10 pairs with 3 dots,		3 pairs with 5 dots.
6 „ „ 2 dots,		6 „ „ 4 „ „		

There are, besides, three combinations of two dots, which differ only by position, viz., two dots in upper line, two in middle line, and two in lower line. Also four combinations which have no pairs, three with four dots, and one with six dots. This exhausts the sixty-three possible combinations. (See accompanying Table II.)

TABLE II.
ARRANGEMENT OF COMBINATIONS ACCORDING TO PAIRS.

	PAIRS (LEFT). (RIGHT).		PRECEDING PAIRS UPSIDE DOWN.		PAIRS SAME EITHER WAY UP.	
1 dot.	0 -	- 0	--	--	--	--
	--	--	--	--	0 -	- 0
	--	--	0 -	- 0	--	--
2 dots.	00		--		--	
	--		--		00	
	--		00		--	
	0 -	- 0	--	--	0 -	- 0
	0 -	- 0	0 -	- 0	--	--
	--	--	0 -	- 0	0 -	- 0
	0 -	- 0	--	--	0 -	- 0
	- 0	0 -	- 0	0 -	--	--
	--	--	0 -	- 0	- 0	0 -
3 dots.	0 -	- 0	6 dots.		00	
	0 -	- 0			00	
	0 -	- 0			00	
	00	00	--	--	00	00
	0 -	- 0	0 -	- 0	--	--
	--	--	00	00	0 -	- 0
	0 -	- 0	--	--	0 -	- 0
	00	00	00	00	--	--
	--	--	0 -	- 0	00	00
	0 -	- 0	- 0	0 -	0 -	- 0
	0 -	- 0	0 -	- 0	- 0	0 -
	- 0	0 -	0 -	- 0	0 -	- 0
4 dots.	00		--		00	
	00		00		--	
	--		00		00	
	00	00	0 -	- 0	0 -	- 0
	0 -	- 0	0 -	- 0	00	00
	0 -	- 0	00	00	0 -	- 0
	00	00	0 -	- 0	0 -	- 0
	- 0	0 -	- 0	0 -	00	00
5 dots.	0 -	- 0	00	00	- 0	0 -
	00	00	0 -	- 0	00	00
	00	00	00	00	0 -	- 0
	0 -	- 0	00	00	00	00

Chessboard-like Arrangement.

Another *chessboard-like* arrangement is also shown. (See Table III.)

From this it will be seen that the combinations may be arranged in sets of four, the two upper in each subdivision-square being pairs, and the two lower ones being these pairs turned upside down, or the lower two combinations being the complementary combinations of the upper.

TABLE III.

ARRANGEMENT OF COMBINATIONS INTO SETS OF FOUR.

Chessboard Arrangement.

Pairs upside down.	<div>0 - - 0 -- -- -- -- -- -- 0 - - 0</div>	<div>0 - - 0 0 - - 0 -- -- -- -- 0 - - 0 0 - - 0</div>	<div>0 - - 0 - 0 0 - -- -- -- -- - 0 0 - 0 - - 0</div>	<div>00 00 0 - - 0 -- -- -- -- 0 - - 0 00 00</div>
	<div>0 - - 0 00 00 -- -- -- -- 00 00 0 - - 0</div>	<div>00 00 -- -- 0 - - 0 0 - - 0 -- -- 00 00</div>	<div>0 - - 0 0 - - 0 - 0 0 - - 0 0 - 0 - - 0 0 - - 0</div>	<div>00 00 - 0 0 - 0 - - 0 0 - - 0 - 0 0 - 00 00</div>
	<div>00 00 0 - - 0 0 - - 0 0 - - 0 0 - - 0 00 00</div>	<div>00 00 00 00 0 - - 0 0 - - 0 00 00 00 00</div>	<div>-- -- 0 - - 0 -- -- -- -- 00 00 - 0 0 - 00 00</div>	<div>0 - - 0 -- -- 0 - - 0 - 0 0 - 00 00 - 0 0 -</div>
	<div>0 - - 0 -- -- - 0 0 - - 0 0 - 00 00 0 - - 0</div>	<div>00 00 -- 00 -- -- -- -- 00 -- 00 00</div>	<div>0 - 0 - 0 - - 0 0 - 0 - - 0 - 0 - 0 0 - - 0 - 0</div>	<div>-- 00 00 00 -- 00 00 -- -- -- 00 --</div>
				<div>Complementary Pairs</div>

THE COMBINATIONS ACCORDING TO THE LINES OCCUPIED
BY DOTS.

The combinations may be considered also with reference to lines on which the dots are placed, and we have the following:—

There are fifteen combinations with *only* upper, middle, or upper-and-middle dots. Three have upper dots *only*, three lower dots *only*.

There are thirty-six combinations having *both* upper and lower dots. Of these twenty-seven also have middle dots, nine have no middle dots.

There are twelve combinations with middle-and-lower, or only lower dots. Of these three have lower dots *only*.

The Fifteen Combinations on Upper and Middle Lines.

0 -	- 0	- -	- -	0 0	- -	0 -	- 0	0 -	- 0	0 0	0 0	0 -	- 0	0 0
- -	- -	0 -	- 0	- -	0 0	0 -	- 0	- 0	0 -	0 -	- 0	0 0	0 0	0 0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

The Twelve Combinations on Middle and Lower Lines.

- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
- -	- -	- -	- -	- -	- -	0 -	- 0	0 -	- 0	0 0	0 0	0 -	- 0	0 0
- -	- -	0 -	- 0	- -	0 0	0 -	- 0	- 0	0 -	0 -	- 0	0 0	0 0	0 0

The Differing 'Tangibility' of some Braille Signs.

Braille signs differ both as to the *number* and *position* of the dots. Now a 1-dot-sign will instantly be distinguished by touch anywhere from a 2-dot-sign. But one 1-dot-sign, *standing alone*, cannot be distinguished from any other 1-dot-sign, and it will be distinguished in *reading* only by its position on the upper, middle, or lower line, or its relative distance from the other signs on the left or right of it.

There are six 1-dot-signs, nine 2-dot-signs, two 3-dot-signs, two 4-dot-signs differing in this way only by their position with regard to other signs. Of these nineteen signs, ten differ both by their position on the lines and their relative intervals from other signs, five differ only by their position on the lines, and four differ by their distance from other signs. The nineteen signs (arranged in pairs, etc., to show their relations) are

```

0 - -0 - - - - - - 0 - -0 - - - - 00 - - - - 0 - -0 0 - -0 00 - -
- - - - 0 - -0 - - - - 0 - -0 0 - -0 - - 00 - - - - - 0 - -0 00 00
- - - - - - - 0 - -0 - - - - 0 - -0 - - - - 00 0 - -0 0 - -0 - - 00

```

I am inclined to think that the sensation produced by the signs rising or falling is more agreeable to the touch than that produced by unequal spaces between letters, and also more quickly perceived.

Use of Differing 'Tangibility' in English Braille.

Reverting for one moment to English Braille, we see that for the letters of the alphabet itself, only *one* of the six 1-dot-signs, only *three* of the nine 2-dot-signs, only *one* of the 3-dot-signs, and *one* of the two 4-dot-signs are used. For punctuation signs, two more 1-dot-signs and three more 2-dot-signs are used. The remaining seven combinations, having front dots only, are used to indicate contractions.

The assignment of these combinations partakes necessarily of the generally haphazard nature of the arrangement of the alphabet. Generally speaking, however, a combination having front dots only is a prefix sign, but not always. (See rules for writing English Braille.)

CONSIDERATIONS OF THE INDIAN AND ORIENTAL LETTERS TO BE REPRESENTED BY THE SIXTY-THREE BRAILLE COMBINATIONS.

Having considered the nature and possibilities of the sixty-three Braille signs, we now proceed with the consideration of the Oriental letters which these signs are to represent.

The leading alphabets used in India are connected more or less directly with the Sanskrit or the Urdu (or Hindustani) alphabet.

Comparing all the alphabets, both letters and sounds, and taking the Roman letter equivalents as generally used in transliteration, we find that altogether some sixty distinct letters must be provided. About three punctuation signs will be sufficient.

Of course no one language uses all these letters, or has so many sounds. Sanskrit, e.g., has no *f* or *z*. Still, many of them have over forty letters. The Malayalam letters are fifty-three in number. Tamil has only thirty-two letters, but at least ten of these have two sounds each. Urdu has thirty-six consonant letters. Whole classes of letters (e.g. the Linguals, or Cerebrals, of Sanskrit, and the Guttural Breathings, etc., of Urdu) are found in Indian languages, which are entirely wanting in English. There are also the aspirated (or explosive) consonants peculiar to the Sanskrit family, as well as the guttural, palatal, lingual, and dental nasals, etc.

In nearly all the Indian languages there are distinct *letters*, as well as sounds, for the short and long vowels. There are also peculiar vowels.

Punctuation signs, properly so called, are almost wanting in Oriental languages; there are, however, various reading signs.

Leaving out of account all conjunct consonants and medial vowel-forms (see p.), there are some seventeen vowels, forty-three consonants, and three heading signs in common use.

It will be seen how different all this array of letters is from our English alphabet, and how necessary it becomes to make a new arrangement of the Braille signs for the Blind in Oriental Braille.

And not only do the Indian alphabets exceed English in the number of the letters employed (as well as in the sounds), but in Sanskrit, etc., there is such an ancient and scientific classification of the letters that to be favourably received in India the scheme for the blind should follow on similar lines, so as to be readily apprehended by the Indian mind.

Medial Vowel-Forms, Conjunct Consonants, etc., in Sanskrit, etc.

In a physiological analysis of Indian and other Oriental languages, overlying the division into vowels, consonants, and semi-vowels, there is a division of the consonants into *hard* and *soft* (or *surd* and *sonant*), and of the vowels into *long* and *short* sounds of the same class.

In analyzing the Indian alphabets it will be found that there are some seventeen 'pairs' of consonants which differ in this way from each other, by being hard and soft (or *surd* and *sonant*) letters of the same class, such as *k* and *g*, *t* and *d*, *p* and *b*, *ch* and *j*, *f* and *v*, *s* and *z*, and others. There are also about seven pairs of vowels which differ by being short and long, *a* (as in fat) and *ā* (far), *i* (pit) and *ī* (pier), *u* (pull) and *ū* (rule), and others.

Classification of Letters in Oriental Languages.

The classification of letters according to the organ principally concerned in their pronunciation is carried out to the fullest extent in Sanskritic languages. (The Hindustani brings in another class (Breaths).) Hindu grammarians are never tired of arranging the letters into classes. They begin with the

letters pronounced by the organ furthest from the mouth, take the other organs in order, and end with the lips. So we get Gutturals, Palatals, Linguals (or Cerebrals), Dentals, and Labials. It is, however, very probable that the palatal class of letters was derived from the guttural, and the lingual class from the dental. The historical basis of Sanskrit consonants would thus be Gutturals, Dentals, Labials.

The Hindustani has traces of what might be thought a more natural order (more like Hebrew), first the Labials (as *b*, etc.), then the Gutturals (*g*, etc.), and last Dentals (*d*, etc.). All alphabets have thus the same consonantal base, the Guttural, the Dental, and the Labial contacts.

Abundance of Symbols in Oriental Alphabets.

In regard to the Sanskrit family of alphabets, it must be noted that they have such an abundance of vowel symbols, and such an elaborate system of conjunct-consonants, that even for natives to learn to read in their mother tongues is one of the most difficult of undertakings. Nor is this to be wondered at when we find that Malayalam, which has only fifty-three initial or ordinary letters, has also so many medial vowel-forms, and such an almost indefinite number of intricate conjunct consonants, that the printers' case requires an assortment of over 700 separate and distinct types to print the most ordinary book. The smallest fount of Sanskrit must have at the very least 500 lower-case types, and other languages have about the same number. Hindustani may not require quite so many, but what it lacks in number it makes up in difficulty and indistinctness of form. In short, it is reckoned that there are some 10,000 symbols used in Indian and Oriental languages (excluding Chinese and Japanese) to represent some seventy sounds which these languages contain.

In the preparation of Oriental Braille for the Blind the task of learning to read has, however, been rendered quite an easy matter by following purely alphabetic rather than syllabic lines, as shown in the following few simple rules :—

(1) The short vowel *a*, as well as every other vowel, is represented by its assigned combination of dot, or dots, wherever the vowel *sound* occurs. (Consonants are not supposed to have an inherent vowel, thus doing away with the necessity for conjunct letters.)

(2) Each vowel or consonant has just the same combination or sign, whether it comes as the initial, medial, or final vowel or consonant of the word (i.e., whether it begins a word, comes in the middle, or ends it).

(3) The same combination represents the same *sound* (as represented by Romanized transliteration) in whatever language it occurs: e.g., in whatever language there is a sound having a letter for which in transliteration *k* would be used the combination assigned to *k* is used for it.

Reading made Easy for the Eastern Blind.

In this way, by eliminating medial vowel-forms, conjunct consonants, etc., in short by using an alphabet instead of syllabaries, it has actually been made easier for a blind boy to learn to read by touch books embossed in Oriental Braille than for one who can see to learn by sight in the corresponding native character.

Besides the superiority which a complete alphabet gives over a complicated syllabary, the blind reader will have in Oriental Braille the advantage of being able to know, from the mere form of the dotted sign, whether it represents a vowel, consonant, or semi-vowel; whether the vowel-sound is a short, a long, or a very short one; whether the consonant is a mute

(closed) one, a breathing, a nasal, or a sibilant, and whether the sound is a hard or a soft one. In learning his dotted letters he will, to a large extent, be able to associate similar signs with similar sounds.

In short, as far as such a thing is possible, the very forms of his combinations of dots will speak to him, making known their sounds and relations to one another.

Of course, such a result has only been arrived at by thoughtful study; help has been sought from linguists, Blind specialists, and others; methods used in various Blind Institutions have been compared with one another, and every suggestion for improvement carefully considered.

The actual result is to provide the blind man with all that he needs, viz., so many dots in such a position for such a letter; the letters give him syllables, syllables give words, reading follows.

The explanation of how the result was arrived at may be seen more fully in the following pages.

Having carefully gone over the arrangements of the Braille dots, and examined the Oriental letters which they are to represent to the blind, some hints for forming the scheme of Oriental Braille were found from the foregoing facts, as follows :—

Assignment of Braille Signs to Vowels, Consonants,

Semi-vowels, etc., in Oriental Braille.

In Indian languages the consonant-forms are generally firm and stable, while the vowel and semi-vowel-forms are often found as small signs, placed above or below, before or after, the consonant of the syllable to which they belong. In Hindustani the vowels are often altogether omitted, the reader being left to fill them in from memory. So the semi-vowels assume forms lighter than consonants, but heavier than vowels. All this

is owing to the alphabets being more like syllabaries than complete alphabets, but, all the same, it is a striking feature, and it is interesting to trace the development of the commanding position as to form of the consonants. In Oriental Braille a method of bringing out this feature has been found, which has also the other advantages of making reading easier to the touch, and entailing the minimum of labour in writing. (See below, "The Backbone of Oriental Braille.") The method is as follows:—

(1) As there are fifteen combinations with upper dots only, middle dots only, or upper-and-middle dots only, and there are some seventeen vowels, these combinations have been used for the vowels. (For exceptions to the rule see Notes.)

(2) As there are thirty-six combinations having *both* upper-and-lower dots, and there are about forty-three consonants, these combinations have been used for consonants. (For exceptions as to nasals, etc., see Notes.)

(3) The twelve combinations with middle-and-lower dots only, or bottom dots only, have been used for semi-vowels and reading signs. (See Notes.)

In this way vowels, consonants, semi-vowels, reading signs may be recognized easily by their general form; by touch or by sight they are distinguished.

Moreover, as the combinations with upper dots only, middle dots only, or upper-and-middle dots only, generally have fewer dots than the combinations with upper-and-lower dots, or upper-middle-and-lower dots, and as the vowels come far more frequently than the consonants, the principle of least labour in writing will be found to have been carried out to a large extent. The semi-vowels come between the vowels and the consonants as to frequency: so also do the combinations assigned to them in regard to the number of dots. This, too, is in the direction of least labour in writing.

Let us now consider how to deal with these consonant signs ;
and first we will make a

Physiological Analysis of Oriental Consonants.

(The "Five Grand Classes.")

A very careful analysis of the consonants in Oriental languages shows that when these are classified according to the organ principally employed in their formation, there are three normal places (which may be taken as the basis of all the others), viz., the places marked by the contact between the root of the tongue and the soft palate, the tip of the tongue and the teeth, and the upper and lower lips. The best examples of these three contacts are *k*, *t*, and *p*. These sounds, or their gentler companions *g*, *d*, and *b*, are found in almost all languages. They are therefore taken as our *first consonantal basis*, giving the principal Guttural, Dental, and Labial Consonants.

In most languages there is another class where the consonants are formed with contact of the tongue and palate midway between the guttural and dental contacts. The letters thus formed are termed Palatals. Of this class two good examples are *ch* (as in chess) and *j* (as in jest). Some philologists regard the Palatals as a modification of the Gutturals (compare *kirk* and *church*), and probably in many cases this is so. In other cases these palatals may be glides of *t* and *sh*, or even *k* and *sh*. This class in Oriental languages calls for distinct recognition.

Then in Sanskritic languages there is an important modification of the dental contact, giving a class of letters called Cerebrals (or Linguals). As already stated, it is almost certain that the Linguals in Sanskrit are modifications of the Dentals, but, whatever their origin may be, these Linguals need to be carefully distinguished from the corresponding Dentals. Taking, then, these five classes in the order in which Sanskrit

grammarians have arranged them, we have Gutturals, Palatals, Linguals, Dentals, and Labials as *the enlarged consonantal basis*. All the Sanskrit letters may be referred to one of these five grand classes, and the principal letters in *all* languages are to be referred to them.

We take Sanskrit as our first language, as having the most complete alphabet.

The first twenty-five consonants of the Sanskrit alphabet are distributed into five classes of five letters each, viz.: (1) Gutturals, (2) Palatals, (3) Linguals, (4) Dentals, (5) Labials.

The first letter of each class is a simple articulation, hard and rough.

„ second	„	„	the (explosive) aspirate of the first.
„ third	„	„	a corresponding smooth and soft sound.
„ fourth	„	„	the (explosive) aspirate of the third.
„ fifth	„	„	the nasal letter of that class.

Then follow the Semi-vowels, and then the Palatal, Lingual, and Dental Sibilants, then the Aspirate, and last the Vedic Lingual Trills.

Thus we get as the foundation of a Sanskritic Consonantal Scheme for Oriental Braille :—¹

Gutturals	<i>k</i>	<i>kh</i>	<i>g</i>	<i>gh</i>	<i>ṅ</i> (the nasal as <i>ng</i> in king). (<i>ng</i>)
Palatals	<i>c</i> (<i>ch</i>)	<i>ch</i> (<i>chh</i>)	<i>j</i>	<i>jh</i>	<i>ñ</i> (<i>ch</i> as in church, <i>ny</i> as in señor). (<i>ny</i>)
Linguals	<i>ṭ</i>	<i>ṭh</i>	<i>ḍ</i>	<i>ḍh</i>	<i>ṇ</i> (pronounced with tongue inverted).
Dentals	<i>t</i>	<i>th</i>	<i>d</i>	<i>dh</i>	<i>n</i> (pronounced as in Italian).
Labials	<i>p</i>	<i>ph</i>	<i>b</i>	<i>bh</i>	<i>m</i>
Semi-vowels	<i>y</i>	<i>r</i>	<i>l</i>	<i>v</i> (or <i>w</i>)	
Sibilants	<i>ś</i> (<i>sh</i>)	<i>ṣ</i>	<i>s</i>		
Aspirate	<i>h</i>				

¹ The Roman letters (except those shown as alternatives in brackets) here used are those adopted by the Geneva Congress for the transliteration of the Sanskrit and allied alphabets.

On this we proceed to build the Consonantal Scheme of Oriental Braille.

Note.—In the Sanskrit alphabet *kh, gh, ch, jh, ṭh, ḍh, th, dh, ph* and *bh* are single characters. The sounds they represent have been termed ‘explosive’ owing to their being strongly aspirated sounds.

Professor Max Müller's Suggestions for New Alphabet.

Professor Max Müller says: “Were we at liberty to frame a new alphabet there can be little doubt that a very simple alphabet might be contrived in which each letter should tell, as it were, its own story. We should want one general sign to express breath, and another to express voice. Each of these signs would be modified so as to show whether they were meant for emissions of voice or breath, or for checks of breath or voice, and we should then only have to contrive marks for the principal places of contact, and the whole consonantal system would be complete” (“On the proper use of the ordinary English Alphabet in transcribing Foreign Languages”).

It is on such principles as these that the scheme for letters for the use of the Eastern Blind has been carried out in Oriental Braille.

The five principal points of contact are distinguished in the consonantal Braille signs in a very simple and easily remembered way (see Principal Points of Contact). Checks of breath or voice are distinguished from breaths by an extra dot uniformly placed or omitted (see Principle of Daghash). Hard consonants are known from soft ones by being reversed (see Principle of Reversal). The sibilants or buzzes have a suitable set of symbols (see Sibilant Forms). Also provision is made for the variety of trills. The semi-vowels have forms related to the vowel forms.

Representation of Sanskrit Consonants in Oriental Braille.

Having in view the idea of symbolizing the relations of the sounds by the relations of the signs, let us take as the backbone of the scheme one side (the left) of the group of

six dots, $\begin{smallmatrix} 0- \\ 0- \end{smallmatrix}$. By itself let this represent the aspirate *h*, but whenever it occurs with other dots added let it be the frame

(backbone) of one of the principal consonants (thus $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ *k*).

As we have seen, there are three principal places of contact. The Braille signs for the first guttural, first dental, and first labial letters are obtained as follows:—

For the first guttural letter add an upper front dot to the backbone.

„	palatal	„	a middle	„	„
„	labial	„	a lower	„	„

	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	Thus	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ is <i>k</i> ,	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	is <i>t</i> ,	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	is <i>p</i> .
--	--	------	--	--	---------------	--	---------------

Note that as the front dot comes lower the lips come closer together.

For the Palatal class, which is derived from the Guttural class, we add a front middle dot. Similarly for the Lingual class, which is looked upon as a modification of the Dental class, we add a front-lower dot.

$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	Thus	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ is <i>ch</i> (from	guttural $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ <i>k</i>),	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	is <i>t</i> (from dental	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ <i>t</i>).
--	------	---	---	--	--------------------------	--

Arranging these symbols in the Sanskrit order of letters, we get as follows *the first letter of each of the five classes*:—

$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	$\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$
Guttural $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ <i>k</i> ,	palatal $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ <i>ch</i> ,	lingual $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ <i>t</i> ,	dental $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ <i>t</i> ,	labial $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$ <i>p</i> .
(surd) $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	(surd) $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	(surd) $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	(surd) $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$	(surd) $\begin{smallmatrix} 00 \\ 0- \end{smallmatrix}$

Then we proceed to get from the hard (or surd) letters *k, ch, t, ṭ, p* the soft (or sonant) letters *g, j, ḍ, ḍ̣, b* by the Principle of Reversal.

The Principle of Reversal (or Principle of Pairs).

For the letter *g* we take the combination which pairs with the sign used for the letter *k*, thus *k* is $\begin{smallmatrix} \text{oo} & \text{oo} \\ \text{o} - & - \text{o} \\ \text{o} - & - \text{o} \end{smallmatrix}$ is *g*. Similarly for the others—

oo	oo	o	- o	o
Guttural o <i>g</i> ,	palatal oo <i>j</i> ,	lingual oo <i>ḍ</i> ,	dental oo <i>ḍ̣</i> ,	labial o <i>b</i> .
(sonant) o	(sonant) o	(sonant) oo	(sonant) - o	(sonant) oo

The Representation of the Sanskrit Explosive Consonants.

First Method (adding an Aspirate).

In regard to the representation of the ten Sanskrit explosive letters *kh, gh, ch, jh, th, ḍh, ṭh, dh, ph, bh*, two methods are available, both good. The first method is to adopt the simple device of adding uniformly the aspirate *h* to each of the corresponding unaspirated letters, *k + h = kh*, etc. In favour of this method several things should be carefully noted. (1) Historically these letters were ligatures, formed by the addition of the aspirate *h* to the corresponding unaspirated letters. (2) In transliterating them into Roman letters the addition of *h* is the method generally followed. (3) Indians make a point of sounding the aspirate in these letters strongly (explosively), and perhaps this is more likely to be done with an aspirate attached to them. (4) The blind scholar, learning only a Sanskrit alphabet, would have ten less signs to learn. (5) The number of Braille combinations is also limited, and a very careful use of them is necessary to secure uniformity

of representation in all languages. Where this first method is adopted we get a complete series, as follows:—

Gutturals	oo	oo o	oo	oo o
	o k,	o o kh,	o g,	o o gh.
	o	o o	o	o o
Palatals	oo	oo o	oo	oo o
	oo c,	oo o ch,	oo j,	oo o jh.
	o	o o	o	o o
Linguals	o	o o	o	o o
	oo t,	oo o th,	oo d,	oo o dh.
	oo	oo o	oo	oo o
Dentals	o	o o	o	o o
	oo t,	oo o th,	oo d,	oo o dh.
	o	o o	o	o o
Labials	o	o o	o	o o
	o p,	o o ph,	o b,	o o bh.
	oo	oo o	oo	oo o

Second Method (the Principle of Daghesh).

In those Sanskritic languages where the proportion of explosive letters to the other letters is very small, the method of adding an aspirate has advantages, and no difficulty arises from the use of the two-cell sign. But in other Sanskritic languages where there is a large proportion of the explosive letters, the addition of the aspirate becomes wearisome in writing, and takes up more space in printing.

To obviate this difficulty, the Principle of Daghesh has been adopted. This principle belongs more properly to the aspirates in the Semitic languages, and was suggested by the use of the Hebrew Daghesh.

This second method is as follows:—By leaving out a middle dot from the ‘backbone’ (o) of a principal consonant (the back-middle-dot of a hard consonant and the front-middle-dot

of a soft one), we get the signs for the aspirated letters from the unaspirated letters, and in this way we provide a set of single signs, formed in one uniform way from the corresponding unaspirated letters. For the use of Sanskritic alphabets we then get a complete series, as follows :—

Gutturals	oo o o	k, kh,	oo o o	g, gh.	oo o o
Palatals	oo oo o	c, ch,	oo o o	j, jh.	oo o o
Linguals	o oo oo	t, th,	o oo oo	d, dh.	o oo oo
Dentals	o oo o	t, th,	o oo o	d, dh.	o oo o
Labials	o o oo	p, ph,	o oo oo	b, bh.	o oo oo

Representation of the Sanskrit Nasal Consonants.

As the nasal consonants are all soft letters, having no pairs, the scheme uses for them, generally, the combinations which are the same either way (right or left). Also, as the nasals have a general resemblance, and historically are differentiated forms of one original letter, these facts have been taken into account in assigning the combinations, following the principle of having similar signs for similar sounds, as far as possible.

Labial *m* is the combination having the upper and lower pairs of dots.
 Dental *n* is the combination having the upper and middle pairs of dots.
 Lingual *ṇ* is the combination having the upper middle and lower pairs of dots.

Palatal *ṇ* is the combination having the middle and lower pairs of dots.
 Guttural *ṅ* is half the labial *m* combination (Anuswara the other half).

The *complete series of Nasals*, in the order of the Sanskrit grammarians, is, then, as follows :—

	- 0	- -	00	00
Guttural	- - ng,	Palatal 00 ny,	Lingual 00 n,	Dental 00 n,
	- 0	00	00	- -
	00			
Labial	- - m.			
	00			

The nasals may be considered as derived from the six-dot *n*.

By leaving out the middle pair of dots we get labial *m*.

„ „ lower „ „ dental *n*.

„ „ upper „ „ palatal *ny*.

The right hand of labial *m* gives guttural *ng*.

„ left „ „ Anuswara *m̐*.

(For Tamil *n̐* see Notes.)

Representation of Sibilants and Trills (Sanskrit and other).

‘ Crooked S ’ Forms, or Slanting Signs for Sibilants and Trills.

The assignment of the signs for the sibilants in all Eastern languages (including, as it does, both Sanskritic and Semitic hisses and buzzes) needed much research and many analyses in order to a satisfactory result. As they form a special class of sounds, they need a special set of signs, and as there are hard and soft sibilants of the same organ, these signs should go in pairs. The three most general hard sibilants are *sh* (as in ship), a sort of *ts* (as in fits), and the simple sibilant *s* (as in sin). For these there are soft sounds to correspond, viz., *zh* (as in azure), *dz* (as in adze), and *z* (as in zeal). (See also notes in the various languages.) The signs for the sibilants have only one upper and one lower dot placed crosswise (or slanting), and only one middle dot, or none at all. For hard sibilants the upper back

dot and the lower front dot signs are used. The soft sibilants have the upper front dot and the lower back dot. For Sanskrit the three signs for hard sibilants are necessary, thus :—

$\begin{array}{c} \text{Palatal} \quad \text{0 -} \\ \text{0 - } \acute{s}, \\ \text{- 0} \end{array}$	$\begin{array}{c} \text{Lingual} \quad \text{0 -} \\ \text{- 0 } \text{ṣ}, \\ \text{- 0} \end{array}$	$\begin{array}{c} \text{Dental} \quad \text{0 -} \\ \text{- - } s. \\ \text{- 0} \end{array}$
--	---	---

Note that a sort of Daghesh method is followed in regard to \acute{s} ($ś$) and s , the \acute{s} being softened to s by leaving out the middle dot. Also note that the lingual sign is a slight modification of the palatal sign, (as the sound is historically).

The trilled r 's have also one upper dot and one lower dot placed aslant, but they have *two* middle dots, thus $\overset{\text{0}}{\underset{\text{0}}{\text{00}}} r$, and

$\overset{\text{0}}{\underset{\text{0}}{\text{00}}} \text{ṛ}$ or ṛ .

Representation of the Semi-vowels.

The combinations for the Sanskrit semi-vowels, etc., are selected from the combinations with upper and lower dots only, or lower dots only, regard being had to the principle of least labour in writing, and the relations of the semi-vowels y and w to the vowels i and u . One peculiar Sanskrit vowel (a vocal r) has been selected from the same combinations.

Representation of the Sanskrit Vowels.

For various reasons, such as the advisability of being able to distinguish, by the *forms* of the combinations, vowels from consonants, and of following the principle of least labour in writing, the combinations for the Sanskrit vowels have been selected from the combinations having an upper dot or dots

only, middle dots only, or upper and middle dots only. No vowel has more than three dots, leading vowels only two. (For exception *r* see Notes.)

In making the selection, a very careful consideration was also given to the necessity for having the characters as distinct as the limits of choice allow, to their comparative frequency of occurrence, to their relations to one another and to the semi-vowels, etc., and last, though not least, to their historical development, e.g., undoubtedly the oldest vowels are the three first (in Sanskrit order), *a*, *i*, *u*, whilst *e* and *o* are later. The vocalic vowel (*r*) is of uncertain origin, and in its long form rarely used. No signs are provided for the dental vowel *ḷ*, and its long form *ḹ*, these being useless, except as being thought to complete the Sanskrit vowel system. (About these see Notes.)

For the sake of many alphabets derived from the Sanskrit alphabet, the short sounds of the vowels *e* and *o* have been placed in the scheme, for though Sanskrit does not use them (*e* and *o* being always long in Sanskrit), other Sanskritic alphabets, Malayalam, Tamil, Telugu, etc., constantly do.

The principle of reversal (or pairs) has been used to distinguish between short and long *u*, short and long *e*, and short and long *o*.

TABLE IV.

ORIENTAL BRAILLE SANSKRIT ALPHABET.

VOWELS.

अ 0 - -- a --	आ 0 - 0 - ā --	इ 00 -- i --	ई -- 00 ī --	उ 0 - -0 u --	ऊ -0 0 - ū --
ऋ -- 00 ṛ 0 -	ॠ ṛ use ṛī	ऌ (l and	ॡ l not used, see Notes)		
ए 00 0 - -- e	ऐ 00 -0 -- ē	ऎ 0 - 00 -- -- ai -- --	ओ 0 - 00 -- o	आ -0 00 -- ō	औ 0 - 0 - -- -0 au -- --

CONSONANTS.

Gutturals	क 00 0 - k 0 -	ख 00 0 - 00 0 - 0 - or -- kh 0 - 0 - 0 -	ग 00 -0 g -0	घ 00 0 - 00 -0 0 - or -- gh -0 0 - -0	ङ -0 -- ṅ -0
Palatals	च 00 00 0 - c	छ 00 0 - 00 00 0 - or 0 - ch 0 - 0 - 0 -	ज 00 00 j -0	झ 00 0 - 00 00 0 - or 0 - jh -0 0 - -0	ञ -- 00 ñ 00
Linguals	ट 0 - 00 ṭ 00	ठ 0 - 0 - 0 - 00 0 - or 0 - ṭh 00 0 - 00	-0 00 ḍ 00	ढ -0 0 - -0 00 0 - or 0 - ḍh 00 0 - 00	ण 00 00 ṇ 00
Dentals	त 0 - 00 t 0 -	थ 0 - 0 - 0 - 00 0 - or 0 - th 0 - 0 - 0 -	द -0 -0 d 00	ध -0 0 - -0 00 0 - or 0 - dh -0 0 - -0	न 00 00 n --
Labials	प 0 - 0 - p 00	फ 0 - 0 - 0 - 0 - 0 - or -- ph 00 0 - 00	ब -0 -0 b 00	भ -0 0 - -0 -0 0 - or -- bh 00 0 - 00	म 00 -- m 00

Semi-vowels	य -- -- y 00	र 0 - 00 r -0	ल -- 0 - l 00	व -- 0 - w -0
Sibilants and Aspirate	श 0 - 0 - ś -0	ष 0 - -0 ṣ -0	स 0 - -- s -0	ह 0 - Asp. 0 - h 0 -
Anuswara 0 - -- 0 -	Vedic	ळ -- -0 and l 00	ॠ -- 0 - -0 0 - lh 00 0 -	ः -0 -0 Visargah -0

ADDITIONAL LETTERS FOR TAMIL, MALAYALAM, ETC. (*see Notes*).

l	-- - 0 00	rr (zh)	- 0 0 - 0 -	r	- 0 00 0 -	Tamil	-- n - 0 - 0
(Linguals.)				(Sub-palatal.)			

Oriental Braille for Urdu, etc.

The sounds represented by the ordinary Roman letters (Italian phonetic values), *a, b, c, d, e, g* (hard), *h, i, j* (jay), *k, l, m, n, o, p, r, s, t, u*, (*v* or) *w, y*, and the diacritically marked *ā, ī, ū, ē, ō, ṭ, ḍ, ṛ*, and *ṇ* (also *ṇ* in Pushtu), are common property to Sanskrit and Urdu, Aryan and Semitic languages. The Braille combinations already assigned to the letters which represent these sounds in Sanskrit are therefore used for the letters which represent the same sounds in Urdu and allied languages. (Note that as Sanskrit has the full list of vowels nothing more is needed for Urdu.)

*The Urdu 'Breathings' (Fricatives).**The Principle of 'Daghesh' (Lene).*

In Urdu there are a number of consonants with soft sounds, such as Aleph, Ayin, *kh, gh, th, dh, f, v, ts, dz*, and others.

For the representation of the sounds which have nothing analogous in Sanskrit, such as Aleph, Ayin, special provision is needed and has been made.

In regard to the three pairs of fricative sounds (*kh* and *gh*, *th* and *dh*, *f* and *v*), the principle of Daghesh (suggested by the Hebrew Dághésh) has been uniformly followed. In a somewhat similar way to the Hebrew pointing, the *sh* sign is distinguished from the simple *s* by an extra dot.

Whether historically the three pairs of Sanskrit aspirates have the same origin as the Urdu fricatives is difficult to

determine; the practical point for the Blind is that *letters* for both series are only found in Hindi. Now as the few Sanskrit aspirates found in Hindi can be represented by the first method of adding an aspirate to the unaspirated letters, no confusion of letters or difficulty of reading can possibly arise. The Sanskritic alphabets can use the full Daghash series uniformly, and so can the Semitic (Hindi using the first method for a few letters). Nothing analogous to the Sanskrit lingual aspirated letters *th* and *dh* seems to come in other languages, nor to the palatal aspirated letters *ch* and *jh*, unless perhaps in Russian the *shch* sound be thought so.

The Urdu Soft Sibilants, etc.

By using the principle of reversal (or pairs) we get the soft sibilants.

		From the combination for palatal <i>ś</i> we get the combination for palatal <i>z</i> .	
		lingual <i>ṣ</i>	lingual <i>z</i> .
„	„	„	„
		dental <i>s</i>	dental <i>z</i> .
„	„	„	„

The Urdu S's and Z's.

Note on the necessity for the various *s* and *z* letters in Urdu being represented by different signs, even though, as is confessed by all, they are sounded alike *s* or *z*. In regard to this, Oriental scholars have urged and Associations have passed resolutions that in transliterating Urdu the various *s* and *z* letters should be carefully distinguished. This is presumably on historical or etymological grounds, for no one contends for any difference in the *s* or *z* *sounds*. In Oriental Braille provision has been made for this difficulty by allowing the use *in Urdu* of various sibilant signs, representing in other languages slight differences of sound, but in Urdu having no difference of sound. Of course, it is open for those who wish to do so to follow the course adopted often in Romanic transliteration of using only one *s* and one *z*. It is only because of the claim of Oriental Braille of being able to accurately transliterate letter for letter that the above provision is made. The course is not recommended otherwise.

TABLE V.

ORIENTAL BRAILLE URDU ALPHABET.

The names of the letters are spelled as usual in Urdu Grammars. The Roman letters are those generally used in Urdu Grammars, etc. The Roman letters *in brackets* are as given in Transliteration Scheme.

ا alif -- a -0 -0	ب be -0 b -0 00	پ pe 0- p 0- 00	ت te 0- t 00 0-	ث ta 0- t 00 00
س se 0- (t) s -0 0-	ج jim 00 j 00 -0	چ che 00 (c) ch 00 0-	ح he -0 (h) h -0 -0	خ khe 00 (k) kh -- 0-
د dal -0 d 00 -0	ڈ da -0 d 00 00	ذ zal -0 (d) z 0- -0	ر re 0- r 00 -0	ڑ ra -0 r 00 0-
ز ze -0 z -- 0-	ژ zhe -0 (z) zh -0 0-	س sin 0- s -- -0	ش shin 0- (s) sh 0- -0	ص sad 0- (s) ts -0 -0
ض zad -0 (z) dz 0- 0-	ط toe 0- (t) t -0 00	ظ zoe -0 (d) z 0- 00	ع ain -- (;) -0 0-	غ ghain 00 (g) gh -- -0
ف fe 0- f -- 00	ق qaf 00 q 0- 00	ک kaf 00 k 0- 0-	گ gaf 00 g -0 -0	ل lam -- l 0- 00
م mim 00 m -- 00	ن nun 00 n 00 --	و waw -- w 0- -0	ه he 0- h 0- 0-	ی ye -- y -- 00
	ں -0 (ŋ) ng -- -0	Pushtu 00 ts -0 0-	Pushtu 00 g (jz) 0- (zh) -0	Pushtu 00 n 00 00

Complete Scheme with Romanic Transliteration.

For the purpose of affording a ready means of comparing the sounds (or letter-values) of the various Indian and other Oriental alphabets, of their accurate transliteration into Oriental Braille, and for easy reference, a complete scheme with transliteration alphabet in Romanic letters is here given, also the general rules for signs and special rules for consonant signs. (For slight variations of pronunciation, etc., see Notes.)

Punctuation (or Reading) Signs.

Indian and other Oriental languages do not make much use of punctuation signs (properly so called), not including vowel marks, etc.

The following have been found sufficient, combined with the principle of indicating pauses by absence of signs and differing spaces :—

For a Comma (or slight pause) use the lower-back-dot combination, - -
o -

For a Hyphen use the middle-and-lower-back-dots combination, -
o -
o -

For Semicolon (or colon) use two commas.

For a Period use three commas, or space-comma-space.

For an Exclamation use comma-and-hyphen.

For an Interrogation use hyphen-and-comma.

For a Paragraph use any number of commas, or comma-space-comma-space.

For Poetry-mark (end of line) use two hyphens, or space-hyphen-space.

In this way, by the use of two of the simplest Braille signs, all the requirements of reading signs for the blind are fully met.

TABLE VI.

ORIENTAL 'BRAILLE'

WITH TRANSLITERATION SCHEME IN ROMANIC LETTERS.

Marks over Vowels.

' (Acute) denotes Long Vowel.
 ~ (Short) ,, Very Short Vowel.
 ~ (Tilde) ,, Nasalization.

Marks under Consonants.

. (a dot) denotes Lingual Consonant.
 - (a dash) ,, Palatal ,,
 < (Çedilla) ,, Breath ,,

The *key-word* indicates (approximately) the sound of the letter.

The *ciphers* represent raised dots ; the *hyphens* show vacant places in

N.B.—The capital letters show the transliteration equivalents.

o - -- A -- (a) India	o - o - A' -- (a) far	oo -- I -- (i) ill	-- oo I -- (i) pier	o - - o U -- (u) pull	- o o - U' -- (u) rule	- o - o A' -- (a) all	- o Heb. -- ä -- very short a
oo o - E -- (e) pet	oo - o E' -- (e) fête	o - oo O -- (o) not	- o oo O' -- (o) note	-- o - ù -- very short u	-- Heb. - o ě -- very short e	oo oo N -- (n) tin	
o - o - H o - (h) hand	- o - o H' - o a soft h	o - oo R - o (r) rice	- o oo R, R - o (rr) hurry	o - o - S - o (sh) wish	- o - o Z - o (z) azure	o - - o S, S - o s) fits	- o Tam. R. o - Z o - (dz) adze
oo o - K o - (k) king	oo - o G - o (g) gun	oo -- K* o - (ch) loch	oo -- G* - o (gh) Tage	oo oo C o - (ch) chin	oo oo J - o (j) jay	oo - o C, * C o -	oo o - J* - o
o - oo T o - (t) ten	- o oo D - o (d) den	o - - o T* o - (th) thin	- o o - D* - o (dh) then	o - oo T o (rt) art	- o oo D oo (rd) heard	o - - o T* (T) oo H. toe t or t	- o o - D* (Z) oo H. zoe d, d, or z
o - o - P oo (p) pea	- o - o B oo (b) bee	o - -- F* oo (f) deaf	- o -- V* oo (v) wave	oo o - Q oo Heb. qoph	oo - o X oo (ch) G. ich	oo -- M oo (m) lamb	oo oo N oo (rn) earn
o - Nasal -- vowel o - sign ~ m, n, etc.	- o -- W, η - o (ng) sing	o - -- S - o (s) sin	- o -- Z o - (z) zeal	-- o - - o - (-) hyphen	-- Tam. n - o ' N - o (') aleph	-- oo Ñ oo (ny) banyan	-- -- Y oo (y) yea
-- Sans. oo R o - vowel (r) vocal	-- Single oo Ei, Ai - o sign (ey) eye	-- o - L oo (l) land	-- - o L oo (rl) hurl	-- o - W - o (w) way	-- - o ; W o - (;) ayin	-- -- , o - (,) comma	-- Heb. -- ð - o very short o

* These represent the Sanskrit aspirates *kh, gh, ch, jh, th, dh, th, dh, ph, bh* ; or alternately the Sanskrit aspirates may be represented by *k + h = kh*, etc.

Nasal Vowel Sign.

Following the practice of Oriental scholars, the nasal vowels are indicated by a following *ng* sign, $\begin{smallmatrix} 0- & -0 \\ - - & (- - \text{ is consonant } ng) \\ 0- & -0 \end{smallmatrix}$ (See Notes.)

ORIENTAL BRAILLE.

General Rules for Signs.

Top	dots	00.	Back dot	0-	front dot	-0.
Middle	„	00.	„	0-	„	-0.
Bottom	„	00.	„	0-	„	-0.

I. Signs with only top, only middle, or only top and middle dots are *Vowels*, e.g.,

$\begin{smallmatrix} 0- & 0- & 00 & - - & 0- & -0 & 00 \\ - - & a, & 0- \bar{a}, & - - i, & 00 \bar{i}, & -0 u, & 0- \bar{u}. \end{smallmatrix}$ (Except $\begin{smallmatrix} 00 \\ 00 \end{smallmatrix} n$.)

II. Signs with both top and bottom dots are *Consonants*, e.g.,

$\begin{smallmatrix} 0- & 00 & 00 & 0- & 0- & -0 & 0- \\ 0- & h, & 0- k, & -0 g, & - - f, & - - s, & - - ng. \end{smallmatrix}$ (Except $\begin{smallmatrix} - - \\ 0- \end{smallmatrix}$ as nasal-vowel-sign.)

III. Signs with only middle and bottom dots, or only bottom dots, are generally *Semi-vowels* or *Reading signs*, e.g.,

$\begin{smallmatrix} - - & - - & - - & - - & - - & - - \\ 0- & l, & - - y, & 0- w, & 00 \text{ vocal } r, & - - \text{ comma, } 0- \text{ hyphen.} \\ 00 & 00 & -0 & 0- & 0- & 0- \end{smallmatrix}$

(Except Aleph, Ayin, ñ, one-cell *ei*, and *ö*. About these, see Notes.)

IV Pairs of signs show Hard and Soft Consonants of the same class, and also short and long sounds of vowels, e.g.,

$\begin{smallmatrix} 00 & 00 & 0- & -0 & 00 & 00 \\ 0- & k \text{ and } -0 g, & - - f \text{ and } - - v, & 0- e \text{ and } -0 \bar{e}. \\ 0- & -0 & 00 & 00 & - - & - - \end{smallmatrix}$

(Except *q* and *x*, *ā* (far) and *ā* (all), hyphen and *n*, and one-dot signs.)

V. Similar signs represent as far as possible similar sounds, e.g.,

$\begin{smallmatrix} 0- & - - & 00 & 00 & - - & 00 & 0- & 0- \\ -0 u \text{ and } 0- w, & - - m \text{ and } 00 n \text{ and } 00 \bar{n}, & 0- k, & 00 t, \text{ and } 0- p. \\ - - & -0 & 00 & - - & 00 & 0- & 0- & 00 \end{smallmatrix}$

Special Rules for Consonant Signs.

- (1) Signs with three back dots are hard mutes, e.g., $\begin{matrix} \text{00} & \text{00} \\ \text{0 -} & \text{0 -} \end{matrix}$ k , $\begin{matrix} \text{00} & \text{00} \\ \text{0 -} & \text{0 -} \end{matrix}$ ch .
- (2) Signs with three front dots are soft mutes, e.g., $\begin{matrix} \text{00} & \text{00} \\ \text{- 0} & \text{- 0} \end{matrix}$ g , $\begin{matrix} \text{00} & \text{00} \\ \text{- 0} & \text{- 0} \end{matrix}$ j .
- (3) Signs with top and bottom back dots are hard breaths, e.g., $\begin{matrix} & & \text{0 -} \\ & & \text{0 -} \end{matrix}$ th .
- (4) Signs with top and bottom front dots are soft breaths, e.g., $\begin{matrix} & & \text{- 0} \\ & & \text{- 0} \end{matrix}$ dh .
- (5) Signs with top back dot and bottom front dot are hard sibilants $\begin{matrix} & & \text{0 -} \\ & & \text{- 0} \end{matrix}$ s .
These have either no middle dot or only one.
- (6) Signs with top front dot and bottom back dot are soft sibilants $\begin{matrix} & & \text{- 0} \\ & & \text{0 -} \end{matrix}$ z .
These have either no middle dot or only one.
- (7) Signs with a top and a bottom dot aslant and two middle dots are
 $\begin{matrix} \text{0 -} & \text{- 0} \\ \text{- 0} & \text{0 -} \end{matrix}$ r 's, as $\begin{matrix} \text{00} & \text{00} \\ \text{- 0} & \text{0 -} \end{matrix}$ r . (Note r as a vowel is $\begin{matrix} \text{00} \\ \text{0 -} \end{matrix}$, got by leaving out a top dot.)

*On the Representation of Letters having similar sounds
by combinations having similar forms.*

It will be observed that the principle of similar sounds having similar signs is very largely carried out in the allotment of the combinations to represent the letters. By observing how the principle of reversal (pairs or similar signs) is used in the 'mute' sounds, and the principle of Daghash in the 'spirants' and sibilants (fricative sounds), and that the aspirate is added for the (explosive) aspirates in Sanskrit, it becomes easy to learn the forms of combinations from one another; thus, from

00	00	00	00	00 0 -	00 0 -
0 - <i>k</i> we get	- 0 <i>g</i> , then	- <i>k</i> and	- <i>g</i> , also	0 - 0 - <i>kh</i> and	- 0 0 - <i>gh</i> .
0 -	- 0	0 -	- 0	0 - 0 -	- 0 0 -
0 -	- 0	0 -	- 0	0 - 0 -	- 0 0 -
00 <i>t</i> ,,	00 <i>d</i> , ,,	0 <i>t</i> ,,	0 <i>d</i> , ,,	00 0 - <i>th</i> ,,	00 0 - <i>dh</i> .
0 -	- 0	0 -	- 0	0 - 0 -	- 0 0 -
0 -	- 0	0 -	- 0	0 - 0 -	- 0 0 -
0 - <i>p</i> ,,	- 0 <i>b</i> , ,,	- <i>f</i> ,,	- <i>v</i> , ,,	0 - 0 - <i>ph</i> ,,	- 0 0 - <i>bh</i> .
00	00	00	00	00 0 -	00 0 -

On the Physiological Bases, etc., of Oriental Braille.

In drawing up Oriental Braille, the sounds in every physiological alphabet obtainable have been very carefully analyzed and compared with the requirements of the letters of Oriental languages. The conclusion arrived at is that the sixty-three Braille signs, *properly arranged*, are quite sufficient to allow of One Uniform Blind Alphabet for All Oriental Languages, which can follow the lines of accurate, simple transliteration, and yet give to the blind reader the great aid rendered by the *methodical arrangement* of the signs representing the sounds. At the same time, the history of the development of alphabets has been kept in view; and, as one result of this, it will be found that the five and six dot letters generally represent the latest differentiations of letters, and are subject to the greatest variation of sound, as in the signs for *t*, *d*, *n*, *c*, *j*, *q*, and *x*.

Representation of the Arabic Numerals.

In English Braille the signs of the first row (of ten), when preceded by the prefix for numbers, stand for the nine digits (1-9) and cipher (0). It is difficult to discover the reason for the order in which these ten combinations are placed. They are, however, very compact symbols, and occupy only the upper and middle dots. If it be considered any advantage to have uniformity with English in numbers, the above arrangement can be followed.

It may be noted at the same time that here again the principle of least labour in writing does not hold good, by a long way; for as there are fifteen combinations having only two dots each the figures could easily have been chosen from them.

Mr. Garthwaite's Arrangement for Arabic Numerals.

Mr. Garthwaite has used an arrangement for the Arabic numerals which has two very great advantages to recommend it. (1) It follows the principle of least labour in writing. (2) The combinations follow the order in which the pins (or types) are placed in the octagonal board used by the Blind in arithmetic, and thereby makes a connection between the board and the figures quite easy to grasp and follow. (Cf. board and figures.) Mr. Garthwaite's arrangement is as follows:—

0	0	0	00	0	0	0	0	0	0
1,	0 2,	0 3,	4,	0 5,	6,	7,	8,	9,	0 0.
				0	0	00	0	0	

Arrangement for Numbers, based on the order of Indian Vowels.

An arrangement for numbers was considered based on the ordinary order, in Indian alphabets, of the vowels, viz., *a*, *ā*, *i*, *ī*, *u*, *ū*, *e*, *ē*, *o*, *ō*. The idea was to take these signs for the digits 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0. This arrangement would (1) follow the Indian order of vowels; (2) occupy only the upper and middle lines; (3) have only two or three dots for each sign; (4) go in pairs of similar signs, for odd and even numbers; (5) the types of octagonal board could be arranged to correspond with signs (for numbers). (1, 2, 3, 5, and 0 would be the same as in English Braille.)

Representation of the Roman Numerals.

For the Roman numerals, I, II, III, IV, V, VI, VII, VIII, IX, 0, etc., and for use where a simple system of numerals is desirable, as in Scriptures, a method has been adopted which is based firstly upon the number of the dots, then upon their position, and also follows the Morse Code as used in telegraphy.

I is one dot, II is two dots, III is three dots, IV is four dots, V is five dots; then for VI, VII, VIII, IX we reckon as follows: Suppose the numeral V *understood*, but left out in writing, and add to this V one, two, three, and four dots, successively, but taken so that they differ in *position* from the first four series of dots. For the cipher, the combination used for Ayin in letters is taken, as being little used in letters, distinct from the other numerals and easy to write. Thus we get the series—

I	II	III	IV	V	VI	VII	VIII	IX	0
o	oo	ooo	ooo	ooo				ooo	
		o	oo	oo		o	o		o
				o	o	o	oo	oo	o

The two dots in II and VII are differentiated by position.

„ four „ IV „ IX „ „

(For VI when used alone all six dots may be used.)

The differences in position are simply to prevent any possibility of mistakes in reading, as also six dots for VI.

For X, XX, XXX, XL, L, LX, etc., the Arabic method is followed. X is I with 0 following, XX is II with 0, XXX is III with 0, and so on.

Prefix and Affix for Numbers, oo (or o - before and - o after the numbers).

XI is, of course, I with I following, XII is I with II following, and so on.

NUMERICAL ARRANGEMENT OF 'BRAILLE' SIGNS. (See p. 44.)

(In 8 rows of 8 signs in each row.)

1 2	1 0-	2 -0	3 00	4 --	5 0-	6 -0	7 00	1st row.
4 8	--	--	-	0-	0-	0-	0-	
16 32	--	--	--	--	--	--	--	
8 --	9 0-	10 -0	11 00	12 --	13 0-	14 -0	15 00	2nd row.
-0	-0	-0	-0	00	00	00	00	
--	--	--	--	--	--	--	--	
16 --	17 0-	18 -0	19 00	20 --	21 0-	22 -0	23 00	3rd row.
--	--	--	--	0-	0-	0-	0-	
0-	0-	0-	0-	0-	0-	0-	0-	
24 --	25 0-	26 -0	27 00	28 --	29 0-	30 -0	31 00	4th row.
-0	-0	-0	-0	00	00	00	00	
0-	0-	0-	0-	0-	0-	0-	0-	
32 --	33 0-	34 -0	35 00	36 --	37 0-	38 -0	39 00	5th row.
--	--	--	--	0-	0-	0-	0-	
-0	-0	-0	-0	-0	-0	-0	-0	
40 --	41 0-	42 -0	43 00	44 --	45 0-	46 -0	47 00	6th row.
-0	-0	-0	-0	00	00	00	00	
-0	-0	-0	-0	-0	-0	-0	-0	
48 --	49 0-	50 -0	51 00	52 --	53 0-	54 -0	55 00	7th row.
--	--	--	--	0-	0-	0-	0-	
00	00	00	00	00	00	00	00	
56 --	57 0-	58 -0	59 00	60 --	61 0-	62 -0	63 00	8th row.
-0	-0	-0	-0	00	00	00	00	
00	00	00	00	00	00	00	00	

Note.—In the upper lines, the dots in all the eight rows are arranged alike, and the second four in each are like the first four.

In the lower lines, the dots in the rows differ, but the second four in each are like the first four.

In the lower lines, there are *no dots* in any sign in the 1st and 2nd rows,
there is a *back dot* in each sign in the 3rd ,, 4th ,,
,, *front dot* ,, 5th ,, 6th ,,
,, are *back-and-front dots* ,, 7th ,, 8th ,,

Numerical Arrangement of the Combinations.

There is also a chessboard-like arrangement of the signs made as follows:—

Let the upper back dot =	1,	and the upper front dot =	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>2,</td><td>1</td><td>00</td><td>2</td></tr></table>	2,	1	00	2
2,	1	00	2				
„ middle „	= 4,	„ middle „	= <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>8,</td><td>4</td><td>00</td><td>8</td></tr></table>	8,	4	00	8
8,	4	00	8				
„ lower „	= 16,	„ lower „	= <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>32.</td><td>16</td><td>00</td><td>32</td></tr></table>	32.	16	00	32
32.	16	00	32				

The combinations can then be arranged in a numerical order corresponding to the sum of the values of the dot, or dots, in each combination.

This arrangement can be used for the purpose of indicating any number from 1 to 63 by one combination of (dot, or) dots, or for indicating the combinations by the numbers 1 to 63. (See numerical arrangement, p. 43.)

ADDITIONAL NOTES ON ORIENTAL BRAILLE.


(a) Note on the Backbone of Oriental Braille.


In reading, the first act of the eye is to distinguish letters. This requires most effort in the case of letters which are nearly alike in form. In those which have a perfectly distinct form of their own, the eye sees some prominent feature and passes on, but in those which are somewhat alike it is the part which differentiates the letter which is instinctively looked for. Take the English alphabet as an illustration. It is to help the eye to discriminate that a dot has been placed over the letter *i* (so that *in* may not be taken for *m*). It is partly for this that *i* has been made into *i* and *y*, and *u* into *u*, *v*, and *w*. It was because the eye was confused by *f* and *ſ* (old-fashioned *s*) that the latter was disused. But the most marked result of the effort to help the eye to distinguish the forms of letters quickly is seen in their coming above and below the line. Thus *d* has been prolonged above the line that it might not be taken for *a*, whilst the *a* has had the back-stroke turned over the front for the same purpose. (Compare italic *a* and *d* and ordinary *a*.) The *j* comes below the line to save it from being taken for *i*. The *g* is derived and differentiated from *c*

for the same reason. So *h* comes above *n*, *k* above *x*, *l* over *i*. So with other letters. For all this we have reason to be thankful. In *b* and *d*, *p* and *q* another device has been brought into play. Here the letters are reversed, *b* and *p* facing one way and *d* and *q* the other. It is very largely to facts like these that we owe the legibility of the ordinary printed page of modern books. Note specially that none of the vowels come above or below the line (*a*, *e*, *i*, *o*, *u*), and that many of the consonants do (*h*, *k*, and *g*, *t* and *d*, *p* and *b*, *j*, *f*, *l*, *q*, *y*), and that *k*, *t*, *f*, which come above the line, are hard consonants, whilst *g* and *j*, which come below the line, are soft consonants. A little more of this and we should have known hard from soft consonants at a glance, simply by their coming *above* or *below* the line. Let us now look at the Blind.

The 'backbone'  in Oriental Braille is a device to effect for the

finger of the Blind what modern printing has done for the eye of the seeing. Whenever the finger touches these "three dots in a perpendicular line" the blind reader can know at once that he is touching a *consonantal* sign. Further, if this backbone is on the left hand of the combination, he knows that it is one of the hard consonants, if it is on the right hand it is one of the soft consonants. Were it not for the difficulty of printing, this backbone could be made a simple perpendicular straight line. The blind reader, knowing that the sign is a *consonant*, and whether it is a hard or soft one, seeks out with his finger-tip for the distinguishing dot or dots which determine exactly which it is, just as the eye does in the printed page. This is what really takes place, though the reader may soon become unconscious of it: still, he is discriminating all the time—deriving, though he may not know it, real and great benefit from the thought and labour expended in the scheme. A similar process is gone through with the signs having both an upper and a lower dot only in a per-

pendicular line , such as the signs for the nasal vowel and *ng*, for *f* and *v*, for *th* (*t*) and *dh* (*d*), for *kh* (*k*) and *gh* (*g*), also with those

with top and bottom dots in a slant line , such as the signs for

sh (*s*) and *zh* (*z*), and others. In the whole scheme there has been throughout a process of grouping, a methodical assignment of particular classes of combinations having similar forms to particular classes of

letters having similar sounds, for the express purpose of making reading an easy task to the Blind of the East. Even the groups have been subdivided with a view to making reading by touch easy. So that, unconsciously perhaps to the reader, but really all the time, the group is fixed—vowels, principal consonants, breathings, then subdivisions, hard or soft consonants, short or long vowels determined by

$\begin{array}{cc} \text{oo} & \text{oo} \\ \text{o} & \text{o} \end{array}$

the form being left- or right-handed, e.g. $\text{o} \text{ } \epsilon$ and $\text{o} \text{ } \bar{\epsilon}$. The Blind

need the utmost consideration. If the dots of the Oriental Braille letters were joined together by lines, it would be found that the groups and subdivisions would appeal to the eye and make reading by sight easy—would provide, in fact, a simple Oriental alphabet for the sighted.

(β) *Use of differing 'Tangibility' in Oriental Braille.*

Of the six one-dot signs, the upper back dot has been assigned to the vowel short *a*. The reasons for this are as follows:—In Sanskrit alphabets the short *a* is inherent in every consonant having no other vowel sign. The short *a* is also by far the most frequently recurring sound. The sign for short *a* meets these two facts. It comes close after the preceding consonant, and completes the syllable to which, according to Hindu grammarians, the vowel belongs. It also follows the principle of least labour in writing. Then, to meet the fact that in some languages short *a*, when final, drops into a very short sound (like very short *ü* in but), the sign for short *a* is dropped one line lower, giving us very short *ü*.

Further, the lower back dot is assigned to the comma. It comes close to the end of the word and is easily written. (English Braille has only one dot for comma sign.) Somewhat similar reasons guided the assignment of the three front-dot signs to the Hebrew half-vowels, very short *ä*, *ë*, *ö*.

In reading, then, *any* one-dot sign is a short vowel, except the lower-back dot, which represents the comma, and as that always comes at the end of a word it gives no difficulty.

In regard to the two-dot signs, the assignment of two very similar signs for such similar sounds as *ā* (in far) and *ā* (in all) hardly needs remark. The use of three very similar signs for *i*, *ī*, and *y* arose from *i* and *y* being used indifferently in some languages, and also that it is possible thus to keep the vowel and consonantal sounds, or letters,

distinct. In regard to the necessity for two very similar signs for \dot{n} (ng) and the nasal vowel sign, advantage is again taken of left and right signs to allow the nasal vowel sign to come close to its preceding vowel, and the nasal \dot{n} to come close to the consonants, k , g , etc., which it so frequently precedes. So also for h and anuswara. The two four-dot signs distinguish two very similar nasals, dental and palatal n (n and \tilde{n}).

In this way Oriental Braille makes good use of the differing 'tangibility' of these nineteen Braille signs.

(γ) *The Principle of Uniformity.*

Oriental Braille is One Uniform Alphabet for the Eastern Blind for All Indian and other Oriental Languages. The general principle, for all and any of these languages, is that any letter of any of the Indian or other Oriental languages, as represented in Oriental Braille by a particular combination of dots, stands always for the same letter of the Romanized alphabet, as given in the Transliteration Scheme, and vice versa, i.e., *a simple yet strict and accurate transliteration method is followed*. Some allowance must be made, in regard to the Semitic languages, for slight variations of pronunciation, and for differentiations by which what is in one language one letter with one sound has in another language differentiated into two letters, neither having quite the sound of the original, e.g., Tsādde into Sād, and Zād.

In Indian languages only a few unimportant exceptions to complete uniformity have been allowed, and these are in the case of languages linguistically and geographically remote.

The advantages of a uniform system are obvious; e.g., a blind man who understands two vernaculars when spoken—and this is often the case in India—can read and write them both with the same Braille character:

In drawing up the scheme, the claims, not of a particular language, but of all the various vernaculars, have for many years been most carefully considered, and discussed with specialists in various languages.

Oriental Braille is very specially adapted to the exigencies of the alphabets of all the great Indian dialects, Bengali, Hindi, Oriya, Urdu, Marathi, Gujarati, Panjabi, as well as Tamil, Telugu, Kanarese, Malayalam, etc., Sinhalese, too, and Burmese; also to the alphabets of the Semitic languages, Arabic, Hebrew, etc. It is called, therefore, the "All India Alphabet for the Blind," or "Oriental Braille."

(1) There is only one combination used for each letter of an alphabet, and each combination represents, in general, only one letter; the (explosive) aspirated letters *kh*, *gh*, *ch*, *jh*, *ṭh*, *ḍh*, *th*, *dh*, *ph*, *bh* of Sanskrit are, however, in special cases considered as digraphs.

(2) The short vowel *a* (as well as other vowels) is represented wherever the *sound* occurs, thus avoiding the necessity for conjunct letters. Of course, Arabic *can*, (if it is thought best), be written without vowels, following native custom, but this is not recommended, as the vowels help the blind reader.

(3) The diphthongs, such as *ai*, *au*, *ei*, are represented as diphthongs, thus, $a + i = ai$, $a + u = au$. In Tamil the *ei* sound, which is of very frequent occurrence and more like a vowel than a diphthong, and is also represented by what appears like one letter, is in Oriental Braille, too, represented by one combination of dots. (Compare in scheme long \bar{e} and *ei*, and the similarity of the sounds with the similarity of the forms of the combinations.) When a single sign is desired for *ai* this combination should be used. For the Prakrit alphabets, if a single symbol is desired for the diphthong *ai*, the sign for \bar{a} (as in all) should be used.

(4) The nasal vowels are represented by adding the nasal-vowel-sign to the vowels, thus $a + \text{nasal-vowel-sign} = \tilde{a}$, or $o\tilde{n}$, etc. This agrees with the general practice of transliteration (cf. French *on*, etc.) and also native writing.

(5) The signs for Aleph and Ayin are allowed to represent in Sinhalese the bleating vowels, and in Burmese the light and heavy accents.

(6) The principle of pairs is used to distinguish short and long *u*, short and long *e*, short and long *o*, and short and long bleating vowels.

(7) The vowels short *i*, long \bar{i} , and semi-vowel *y*, being similar sounds, have three similar combinations allotted to them. In some languages the vowel *i* and the semi-vowel *y* seem to be used indifferently. Hence the necessity for very similar signs, which yet *can* be accurately used, as required.

(8) The sign for semi-vowel *w* is derived from the sign for short *u*, being written in middle-and-lower instead of upper-and-middle. Like *i* and *y*, *w* and *u* are used indifferently in some languages. (Similar sounds here have similar signs.)

(9) The long vowel sound \bar{a} (as in far), and the vowel sound \bar{a} (as in all), being very similar sounds, have a pair of very similar signs.

(10) In Malayalam and other languages there is a final vowel sound like a very short *u* (as in but). In Malayalam it differentiates the adjectival participial from the adverbial. In modern printing a sign is used for it. So the sign for short *a* is written one line lower to indicate this sound. This is the ur-vocal (or un-vocal), or neutral vowel, the sound of which is so much used in English. (See Max Müller.) This is Heb. vocal Sheva.

(11) Very short *ă*, *ĕ*, *ŏ* are the half-vowels of Hebrew (Semitic sounds). They are never found at the beginning of words. In Sanskrit short *a* is the only one-dot vowel-sign, and the comma is the only other one-dot sign used.

(12) The guttural nasal *ng* and Anuswara (or nasal-vowel-sign) are interchanged with one another in Malayalam and other languages. Words are written by natives indifferently with either. In many cases perhaps it hardly matters, in others it may. They are *not* differentiated in Hindi, Marathi, Gujarati, and Punjabi. But Sanskrit, Bengali, Oriya, and Sinhalese differentiate them. It is therefore a very great advantage to have for these two sounds two combinations so nearly alike as the nasal *ng* and Anuswara (nasal-vowel-sign). The nasal-vowel-sign is properly used in some languages to indicate a nasal pronunciation of the vowels (e.g. in Hindi). The nasal-vowel-sign is used for 'Tanwīn' in Arabic.

(13) The sign for Tamil *ṇ* is derived from the sign for *ng* (*ŋ*) by writing one dot a line lower. This sign is a makeshift.

(14) The sign for letter *q* is derived from *k* by adding the front lower dot.

(15) As there are in many languages two *r*'s, hard and soft (or lingual and dental), a peculiar *pair* of combinations have been allotted to these trilled letters. In some languages these two *r*'s are often written (wrongly?) for one another. In this case, as in many others, the ear would correct the sign if wrong. In Malayalam the difference of pronunciation is very slight; the *letters*, however, are quite distinct, requiring the two signs. The Sanskrit vowel *r* sign is got from the

palatal *r* by leaving out the top dot, thus $\overset{\circ}{oo}$ from $\overset{\circ}{oo}$. The long sound (or letter) of the vowel *r* is hardly ever used in ordinary books, so no sign is provided. When it does occur the short *r* with *i* following can be used (or *ar*). See Grammars.

(16) The short and long vowels *ḷ* and *ḹ* are subtilities invented by Sanskrit grammarians, perhaps to add to the completeness of the

Sanskrit alphabetical system. As they do not occur in any ordinary books in any languages, no signs have been provided for them; and as they are said to differ little in sound from the letter *l* with short and long *ṛ* added, they can in the one root in which they come be so represented.

(17) There are, however, two *l*'s in constant use in Tamil, Malayalam, and also in Sanskrit, viz. lingual *ḷ* and dental *ḻ*. A pair of three-dot combinations have been assigned to these trilled letters. As there is also a certain amount of similarity between the *r*'s and *l*'s, there is also a certain amount of similarity in the combinations used for these semi-vowels. Besides this, the letters *l* and *r* are often interchanged. (In Sanskrit the linguals *ṭ* and *ḍ* seem interchangeable with *r* and *ḷ*. A mistake would only alter one dot in such cases in *ṭ* and *r*.)

(18) In the representation of the surd sibilants it seems impossible to avoid a slight variation of phonetic values in the case of one sign. The sign for the *ts* Semitic sound is used in Sanskritic languages for the lingual hard sibilant *ṣ*. As these two hard sibilant sounds do not come together in any language, no difficulty in reading can arise from this slight phonetic variation. (Sanskrit has nothing analogous to the *dz*.) The signs for the Sanskrit sibilant letters, palatal *ś* and lingual *ṣ*, are so very near alike as to be fit companions for the two sounds (or letters) which, both by the illiterate and the learned, are constantly mixed up in many tongues. The practical point for the Blind is that the sounds (or letters) *can* be accurately represented, and if a mistake is made the touch will indicate, by the top and bottom dots being aslant, a sibilant form, and the context, or ear, correct the sign. Historically the lingual *ṣ* is a variety of the palatal *ś* required by the refinement of the Sanskrit alphabet. There is more confusion in the history and use of sibilants than in any other class; fortunately, however, the scheme provides for accurate transliteration of letters, and a sufficient variety of their sounds. The sounds represented by the Roman letters *ts* and *dz* are considered by some phoneticians as double sounds. This probably is so in some languages, but in others the sounds are glides, in which the glide is so quiet that the sounds are really single sounds. However, so long as the languages use single letters for them, strict transliteration must provide single signs, as in Oriental Braille.

(19) In regard to the Sanskrit 'explosives' *kh*, *gh*, *ch*, *jh*, *ṭh*, *ḍh*, *th*, *dh*, *ph*, *bh*, Max Müller writes: "We know from the physiological analysis of the alphabet that three or sometimes four varieties exist for each of the three consonantal contacts. Sanskrit alone can

boast of possessing the variety entire. Greek is driven to merge the difference between the soft and hard aspirates, and instead of Sanskrit soft aspirates it has to use hard aspirates. The soft aspirated checks are in Sanskrit of far greater frequency and importance than the hard aspirates."

(20) The combination for *h* has the upper-middle-and-lower *back* dots. There is in Hindustani another *h* for which the upper-middle-and-lower *front* dots combination is used. These two similar signs are used in Sanskrit, etc., to distinguish between the aspirate and Visargah

o -	- o
o -	- o

(*h* and *h*). The letter *h* is left-hand o -, Visargah is right-hand - o .

As the aspirate follows the consonants in the explosive letters *kh*, etc., this allows of the aspirate coming close to its consonant in *kh*, etc., when considered as a digraph.

In Kanarese, Telugu, and Sinhalese *h* is used also as Visargah (*h*). By the use of these two similar signs for *h*, in Western languages, a digraph like *th* (as in thin) can be distinguished from a *t* followed by the aspirate (as in carthorse).

(21) The principle of pairs is a very great help to the Blind in reading. It also makes many mistakes in reading or writing of less consequence, e.g., if the blind reader takes a *p* for a *b*, his ear will at once correct the mistake. In fact, in some languages, e.g. Tamil, there is only one *letter* for the two *sounds* of *p* and *b*, viz. *p*, which is pronounced in some positions of a word as *p* and in other positions as *b*. So there is only *one* letter *t* which has *two* sounds, and *one* letter *k* with *two* sounds. The advantage of pairs in writing similar sounds in the Indian languages is even greater than in reading. In writing Braille the paper is reversed; this makes it necessary to reverse the form of the letters, so that the signs may come right when the paper is turned over. Pairs help to do this.

(22) In Tamil, Malayalam, and other Dravidian languages there are three sub-palatal sounds, *ṭ*, *ḍ*, *ṇ* (without letters), of constant occurrence. They are pronounced very much like the dentals *t*, *d*, *n*, but the point of the tongue is raised to the upper gum instead of to the teeth. Here, again, very similar sounds have very similar signs, the signs for sub-palatal *ṭ*, *ḍ* being got from the signs for the lingual *t* and *d* by removing a dot, while the sub-palatal *ṇ* is half the palatal *n* sign. Tamil has a letter as well as a sound for the sub-palatal *ṇ*, Malayalam has the distinction in the sounds, but has only one letter. (See Grammars.) Tamil has six nasal consonants,

guttural *ng*, palatal *ny*, lingual *n*, dental *n*, and sub-palatal *ṇ*, all, too, in constant use and having different letters.

(23) The signs used in Tamil, etc., for dental *t* and *d*, and sub-palatal *ṭ* and *ḍ*, are also used in Hindustani, Persian, Arabic, etc., to distinguish different *t*'s and *d*'s.

(24) The resemblance of dental *l* sign to capital *L* is accidental, as also is the resemblance of lingual vowel *ṛ* ($\overset{\cdot}{\underset{\cdot}{\underset{\cdot}{\text{O}}}\text{O}}$) to lower-case *r*, but

the resemblances between the *r* and the *l* signs are the result of thought. They are homophones; *r*, being the firmest, has a four-dot sign, except when it is used as a vowel (or is vocalic), then it has only three dots; *l*, as being the softer sound, has a three-dot combination, written on the middle and lower lines like the other semi vowels. The Vedic *ṛ* appears to be a mixture of *l* and *r*. (Compare the lingual *ṛ* in Malayalam, Tamil.) The semi-vowels *r* and *l* are frequently interchanged in Sanskrit, *r* being an old form of *l*.

(25) There is some resemblance between the forms of the signs for *e* and *r*, *o* and *l*; for the reason of this see Whitney, "Life and Growth of Language," p. 62.

(26) Fifty-four signs are wanted to exactly transliterate all the Indian languages, except Urdu, for which six additional signs are required.

(27) It cannot be too strongly impressed upon anyone who may read these notes, that it is not at all necessary, or even advisable, that an attempt should be made to set before the uneducated pupil the explanation, or even a statement, of the classifications or the reasons for the signs as given here. Insensibly he will profit by it, even if it is never formally stated to him, though, as in the case of reasoning, a study of logic is profitable, so to the teacher a knowledge of the reasons for Oriental Braille will be a help to himself and to his scholar.

(28) In Arabic note that—

For alif with maddah, use the sign for long *ā* (as in far).

For hamza, use middle-back-dot (very short *ʾ*).

For wasl, omit alif and fathah, leaving space.

For silent *y* (final), use upper-front-dot (very short *ä*).

For sukun, no extra sign is required. (Sukun is same as jezma.)

For tashdid, double the consonant.

For tanwīn, use the guttural nasal (*ṇ*) combination.

Fathah is short *a*, kasrah is short *i*, dammah is short *u*.

- (29) Arabic letters are Persian and Urdu also, but not *vice versâ*.
 Persian letters are Urdu also, but not *vice versâ*.
- (30) Assamese is written in the Bengali character.
 Pashto is written in the Persian character.
 Sindhi is written in the Urdu character.
- (31) In Urdu both the 'explosives' and some of the true aspirates occur.
- (32) In both Urdu and Hindi it is open to use for the Sanskrit aspirated letters the First Method (by adding an aspirate).
- (33) In Hebrew Mr. Garthwaite gives as reading signs—
 For sōph pāsūq use full-stop. (Three commas, or space-comma-space.)
 For ethnāh use colon. (Two commas, or space-comma.)
 For lesser distinctives use comma.
 For maqqaph use hyphen sign.

(δ) *On the Phonetic Value of Oriental Braille Signs.*

In the Oriental Braille Transliteration Scheme the usual Italian (or Continental) phonetic value of the letters is taken as the standard for comparing the different Eastern alphabets. The letter *j* is, however, as in *jay*, *ch* as in *church*, *g* as in *gun*, *q* as in Heb. *qof*, *w* as in *way*.

The Oriental Braille signs for Sanskrit and Hindustani follow these (Italian) values of vowels, etc.; other languages follow the Sanskrit and Urdu, so that it will not alter the Oriental Braille signs whatever alphabet the vernacular may be written in, e.g., whether Urdu uses the Persian, Devanagari, or Roman character, or Hindi is written in the Devanagari or Kaithi character.

First Readers for the Blind should follow strict transliteration methods, as being, at once, the best practical method and most in accordance with Indian ways. This will also prevent any confusion to a native teacher.

Some phonetic peculiarities are, however, noted by Mr. Garthwaite, e.g.—

- (1) In Bengali and Oriya the letter *a* is pronounced as a short broad *o*.
- (2) Indian grammarians count *ai* as belonging to the class of *e*.
- (3) In Malayalam sub-palatal *r* when doubled (*rr*) is pronounced as *tt* (as in *utter*).

- (4) In Tamil the palatal letter *ch* (*c*) is generally soft, like *ç* in *çedilla*, but after *r*, or when doubled, like *ch* in *church*. (Use *ç* and *c* in transliterating.)
- (5) In Burmese the letter *o* seems to have more of an *a* (as in *all*) sound.

(*ε*) *Comparison of Sanskrit and Urdu Letters and Sounds.*

Comparing Sanskrit and Urdu in regard to letters and sounds, as represented by accurate Roman transliteration, we find as follows :—

(1) As to the *Vowels*, Sanskrit is so complete that nothing further is needed for Urdu. Nasal vowels are symbolized, in both Sanskritic and Urdu languages, in native writing and in Roman transliteration, by the addition of a nasal (as nasal-vowel-sign). (About half-vowels see Notes.)

(2) As to *Consonants*, Sanskrit and Urdu both have guttural *k* and *g*, palatal *c* and *j*, lingual *t* and *d*, dental *t* and *d*, and labial *p* and *b*. Both have the semi-vowels *y*, *r*, *l*, *w* (and *v*). Of the five Sanskrit nasals, Urdu (including Pashtu) has four (palatal *ñ* being wanting). The Sanskrit sibilants and aspirate have practically their equivalents in Urdu. The Sanskrit Visargah sign answers for the Urdu butterfly *h*, whilst the Urdu toe (*t̤*) answers to the sub-palatal *t̤* of Malayalam, Tamil, etc. Sanskrit has letters, and Urdu has not, for the vowel *r*, palatal nasal *ñ*, and Vedic *ṛ*.

Urdu has letters, but Sanskrit has not, for (1) the Breathings Alif and Ayin, and *f* (deaf); (2) the Soft Sibilants, *z* (zinc), *z̤* (azure), *z̤* (adze), and *z̤* (same as *z̤*). (These four *z*'s are for exact transliteration from Perso-Arabic writings.) Alif and Ayin signs may be taken for the Sinhalese bleating vowel letters and the Burmese light and heavy accents. Ayin, *f*, *z*, and *q* are used in Hindi, Hindi (or Sanskrit) dotted letters being used for them. Note also that the *sounds* *g* (G. Tage) and *d̤* (then) are much used in Tamil, Malayalam, etc. The peculiar Tamil and Malayalam letter (*r* or *zh*) is often like *z̤* (azure). This leaves only *t̤* (thin) and two *z*'s not found in Sanskritic languages.

Taking account of ALL the Sanskritic and Urdu-like languages, we find that (with these few exceptions) *the letters and sounds agree to so great an extent, that the same Braille signs can serve them all*, especially as the Sanskrit aspirated letters have an alternate method of representation available.

(5) *The Size of the Braille Embossed Points.*

The Braille signs may, of course, be made any size, but even for beginners they should not be larger than can be easily felt by the tip of one finger. The *kind* of embossed point made needs very careful attention; it should be sharp enough to be perfectly distinct, yet not so sharp as to feel rough to the touch. It needs to be conical rather than rounded, yet the top of the dot should not break through the paper.

The First Readers for the Blind should be made large enough to induce the Blind to try to feel a few letters; after the lessons a medium size of letters should be introduced. Double Pica makes a convenient size, as it will mix with printing. Sharp children naturally can read very small dotted signs.

In languages with a polysyllabic structure it is recommended to use the paper the long way about, so as to avoid loss of space and confusion to the reader through the breaking of words at the end of lines. About fifty-two letters can be thus got in one line (the usual number is thirty-five). Then fourteen lines of interlinear Braille can be easily got on each side of a sheet of paper. This gives 1456 letters and spaces on each sheet of paper.

One great advantage of Braille signs is that they can be written by a blind person, so that a blind man can write for himself or other blind. Volunteers can also render great help by writing out Scriptures, etc.

ST. MATTHEW, XX, 30-34.

And behold,	Two Blind Men sitting by the way side,
when	they heard that Jesus passed by,
	cried out, saying,
	“Have mercy upon us, O Lord, thou son of David.”
and	The multitude rebuked them,
because	they should hold their peace,
but	they cried the more, saying,
	“Have mercy upon us, O Lord, thou son of David.”

And Jesus stood still,
and called them,
and said,
“ What will ye that I shall do unto you.”

 They say unto Him,
“ Lord, that our eyes may be opened? ”

So Jesus had compassion on them,
and touched their eyes.
and immediately their eyes received sight,
and they followed Him.

Blind and burdened men groping in a dark world,
cry for the light to Him who makes it,
for mercy to the Father of mercies.
They are told that they interrupt the orderliness
of things—of religion—of Providence ;
Christ is guiding the course of events,
should two blind men with their cries be allowed to arrest His advance ?

The great Christ has great things to do,
but it is little to open these blind eyes.
The importunity of the blind and the maimed and the leprous
is no offence to God,
nor should it be an offence to us.
The Church is not to press on as if it could save humanity
without saving individual men.
Its movement should be so ordered
that the cry of one soul might arrest the advance.
Men do not exist for the church, but the church for men,
So the Lord taught, He stood still, and called the men.

Expositor.

(θ) *Examples of Oriental Braille Alphabets.*

HEBREW.

--	-0	-0	00	00	-0	-0	0-
-0 א	-- ב	-0 ב	-- ג	-0 ג	0- ד	00 ד	0- ה
-0	00	00	-0	-0	-0	-0	0-
00	-0	-0	-0	0-	--	00	00
00 ה	-- ו	-- ז	-0 ח	-0 ט	-- י	-- כ	0- פ
00	00	0-	-0	0-	00	0-	0-
--	00	00	00	--	0-	0-	0-
0- ל	-- מ	00 נ	-0 ס	-0 ע	-- פ	0- פ	-0 צ
00	00	--	0-	0-	00	00	-0
00	0-	0-	0-	0-	0-	--	--
0- ק	00 ר	0- ש	-- ש	-0 ת	00 ת	-- ,	0- -
00	-0	-0	-0	0-	0-	0-	0-
--	0-	00	--	--	-0	-0	0-
0-	0-	-0	00 ,	00 ,	00 .	0- ך	--
-- ך	-- ך	-- ך	-0 ך	-- ך	-- ך	--	-- ך
00	00	0-	0-	-0	--	--	--
0-	--	00	-0	--	-0	--	-0 ך
-- ך	-- ך	-- ך	-- ך	-- ך	-- ך	-0 ך	00

In reference to Hebrew and the Semitic languages generally, there is the question of the direction of the writing for consideration; also, in case it should be written from right to left (Hebrew fashion), whether the letters also should be reversed. Oriental Braille here puts the writing from left to right, and the letters as in Sanskrit, Greek, etc.

ENGLISH.

0-	-0	00	-0	00	0-	00	0-
-- a	-0 b	-0 c	00 d	0- e	-- f	-0 g	0- h
--	00	0-	-0	--	00	-0	0-
00	00	00	--	00	00	0-	0-
-- i	00 j	0- k	0- l	-- m	00 n	00 o	0- p
--	-0	0-	00	00	--	--	00
00	0-	0-	0-	0-	-0	--	00
0- q	00 r	-- s	00 t	-0 u	-- v	0- w	-0 x
00	-0	-0	0-	--	00	-0	00
--	-0						
-- y	-- z						
00	0-						

Only to show English *a, b, c* order.

RUSSIAN.

0 -	- 0	- 0	00	- 0	00	- 0	- 0
-- а	- 0 ъ	-- в	- 0 г	00 д	0 - е	- 0 ж	-- з
--	00	00	- 0	- 0	--	0 -	0 -
00	00	00	00	--	00	00	0 -
-- и	-- й	-- і	0 - к	0 - л	-- м	00 н	00 о
--	--	--	0 -	00	00	--	--
0 -	0 -	0 -	0 -	0 -	0 -	00	- 0
0 - п	00 р	-- с	00 т	- 0 у	-- ф	-- х	0 - ц
00	- 0	- 0	0 -	--	00	0 -	0 -
00	0 -	00	- 0	--	- 0	--	00
00 ч	0 - ш	- 0 щ	- 0 ъ	00 ы	-- ь	00 ѳ	- 0 э
0 -	- 0	0 -	--	--	--	- 0	--
- 0	--	0 -	--				
0 - ю	-- я	- 0 ѳ	0 - ѵ				
--	00	0 -	- 0				

GREEK.

0 -	- 0	00	- 0	00	- 0	00	0 -
- - α	- 0 β	- 0 γ	00 δ	0 - ϵ	- - ζ	- 0 η	- 0 θ
- -	00	- 0	- 0	- -	0 -	- -	0 -
00	00	- -	00	00	00	0 -	0 -
- - ι	0 - κ	0 - λ	- - μ	00 ν	- 0 ξ	00 \omicron	0 - π
- -	0 -	00	00	- -	00	- -	00
0 -	0 -	0 -	0 -	0 -	00	00	- 0
00 ρ	- - σ	00 τ	- 0 υ	- - ϕ	- - χ	0 - ψ	00 ω
- 0	- 0	0 -	- -	00	0 -	- 0	- -

Suggestions.

0 - - 0

o - for spiritus asper (- **o** for spiritus lenis).

0 - - 0

a, *ι*, *υ* are short or long (the proper length vowel might be used).

- 0

- - *ng* might be used for γ before gutturals.

- 0

-0 - - - might be used before or after vowel signs to show the
- - -0 - - three accents, ' ^ ^.

- - - - 0

Capital letters for names may be represented by a double letter.

Also various suggestions are available for Modern Greek.

PITMAN'S SHORTHAND ALPHABET.

For use with Braille Shorthand Schemes.

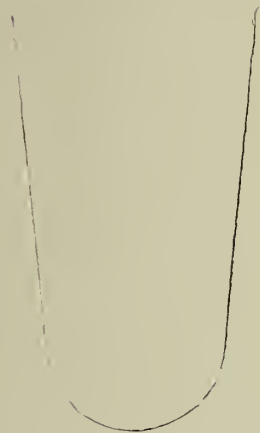
(The Shorthand characters are used by kind permission of Sir Isaac Pitman & Sons, Ltd.)

o - o - p oo	\ -o oo b	\ o - oo t	-o oo d	oo oo g	/ oo oo j	/ o -k o -	— -o -o g —
o - -- f oo	\ -o -- v	\ o - o - t	(-o o - t	(o - -o s) -o -o z) o -f -o) -o -o z
oo -- m	oo oo n	-o -- n	oo o - l	o - oo r	-o o - w	-o -- y	-o oo
o - o - h o -	/ o - -- a	/ o - -o s	/ oo o - e	/ oo -o e	/ oo -- i	/ oo oo j	/
o - oo o	-o -o w	-o o - x	-o oo o	o - -o u	-o o - u	-o -o	-o -o

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